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March 14, 1996

William F. Caton, Secretary
1919 M Street, N.W., Room 222
Federal Communications Commission
Washington, DC 20554

Re: MM Docket No. 95-176

Dear Mr. Caton,

Enclosed are the original and eleven copies of EEG Enterprises, Inc.'s comments on the Notice of Inquiry on Closed Captioning and Video Description of Video Programming.

Very truly yours,

EEG Enterprises, Inc.

William Posner
President

WP/mmp

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Closed Captioning and Video Description of Video Programming	)	MM Docket No. 95-176
	)	
	)	

To the Commission.

COMMENTS OF EEG ENTERPRISES, INC.

I. INTRODUCTION

EEG ENTERPRISES, INC. ("EEG") hereby responds to the Notice Of Inquiry ("NOI") adopted in this proceeding on December 1, 1995.

EEG is a member of the National Association of Broadcasters ("NAB"), the Consumer Electronics Manufacturers Association ("CEMA") of the Electronics Industries Association ("EIA") and a member of the EIA subcommittee R4.3, Television Data Systems Subcommittee ("TDSS"). EEG has actively participated in the deliberations of the TDSS in its efforts to improve and expand the usefulness of the Line 21 Closed Captioning system and to develop advanced caption technology.

EEG has been involved in the Line 21 Closed Captioning system since 1979. We have been continuously participating in the system development and equipment manufacture for the Line 21 system since that time.

EEG feels particularly qualified to speak to some of the cost issues associated with closed captioning since we were the only manufacturer of Closed Caption broadcast equipment between 1980 and 1992 and are currently the primary source of such equipment. In addition, EEG has designed and licensed several versions of Line 21 decoder integrated circuits which are currently being used in television receivers and VCRs.

II. COMMENTS ON THE AVAILABILITY OF CLOSED CAPTIONING

Caption Availability - EEG cannot provide statistical information regarding the level or type of programming that is being closed captioned. However, through our years of experience in supplying the encoding equipment that is used to close caption, we can state that the level of interest and use of captioning equipment increased in the 1990s as a result of the enactment of the Television Decoder Circuitry Act of 1990 ("TDCA"). Much of the increase has centered around the use of EEG's portable encoder, which suggests greater interest in the captioning of locally broadcast material.

Program Source - As noted in the NOI, there is an apparent disparity in the amount of closed captioned programming provided by broadcast and cable entities. We believe that this disparity came about due to the manner in which closed captioning developed. The closed captioning system development program heavily involved the broadcast networks, particularly PBS and ABC. From the beginning of captioning in 1980,

all the major networks provided some level of closed captioned programming. Furthermore, since that time, most of the efforts made in promoting captioning have been focused on the broadcaster community. This suggests that external "pressures" are effective in expanding the availability of captioned programs. Some of the factors that have contributed to the growth of closed captioning by broadcasters that we are aware of are:

a) DOE grants underwriting network and local captioning.

b) FCC review of captioning efforts at license renewal time.

c) Local broadcaster's recognition of the potential for increased viewership in specific markets having high hearing impaired populations.

d) Awareness on the part of management of the problems of the deaf and hard of hearing and a desire to provide assistance in the public interest.

Other Delivery Systems - With regard to questions about captioning by other delivery systems, EEG knows of instances where previously captioned program material being transmitted by "other means" has destroyed the ability to display the captions. We believe that in the very least, it should be required that previously captioned material not be lost when alternate delivery means are used.

III. COMMENTS ON CAPTIONING REQUIREMENTS

Guidelines - The existing specifications and standards clearly define the control codes, character codes and display characteristics for closed captioning. They also provide

guidance for the use of the standards. However, there are no standards that provide a definition as to what constitues acceptable captions. EEG believes that there is a need to provide guidelines which would clarify what is meant by "captioning". Without such guidelines, a mandatory captioning requirement could result in "captioning" being presented based solely on the lowest cost of production, without any regard as to their effectiveness. The guidelines should reflect a reasonable compromise between quality and cost and be truly guidelines rather than dictates. The guidelines should address such things as:

Quality of the translation of the audio data to visual data.

Quality of the synchronization of captions to the audio.

Form of the visual presentation.

Accuracy of the captions.

Costs associated with captioning.

Mandatory Requirements - In general EEG believes that the requirements for closed captioning should include the following considerations:

A. The Closed Captioning signal represents the visual depiction of the audio portion of the video program material and should be deemed to be an inherent part of the program. It should carry the same importance as the audio portion.

B. The encoded caption master should be created at the production origin wherever practical. Subsequent processing of a captioned master should maintain the validity and accuracy of the captions to the same degree as the audio portion.

C. Wherever possible, all scripted programs should be captioned during production using the Pop-on display mode and presented with the same timing and clarity as the audio. If the time to air is insufficient for the creation of a Pop-on data base, then the caption material should be presented in a Roll-up display mode which has been edited to present a well timed, accurate depiction of the audio. As was noted in the NOI, this is essentially already being done on all prime time programming and many movies. Formalizing this as a requirement would therefore not be burdensome.

D. Non-scripted material should be captioned in real time. If the real time captioned program is to be subsequently re-aired at least several more times, then any caption errors should be corrected before subsequent airings are made.

E. We believe that exemptions from the captioning requirements should be established primarily on some basis which relates the cost of captioning to the cost of production. Secondary factors should be considered as well, such as audience size and the level of difficulty in achieving the captions. However, it should be recognized that if the decision limits for exemption are set too low, captioning will remain solely in the realm of prime time and nationally produced programming. The setting of reasonable exemption limits will require the cooperation of the several entities involved in the production, transmission and viewing of captioned material.

IV. COSTS ASSOCIATED WITH CAPTIONING

Cost Factors - The overall cost of providing Closed Captioning is made up of two factors; the cost associated with creation of the caption data base and the cost of creating the encoded caption signal. Each of these factors are comprised of both a facilities (hardware) element and a labor element. We believe that the cost of encoding the caption signal is relatively small compared to the cost of creating the caption data base therefore, we believe that the yes / no decision for captioning is based primarily on the cost of caption data base creation.

Encoding Infrastructure - A critical factor in making captioning available is the establishment of the infrastructure for caption encoding. However, once such captioning infrastructure is in place, many programs can be captioned without incurring additional set up costs.

The hardware associated with this infrastructure represents fixed, one time costs. The infrastructure includes such things as the encoding and monitoring equipment and the means for transporting the caption data base to the encoding equipment, i.e.; modems and phone lines. This equipment does not represent a significant cost in the captioning cost equation since their original costs are small by comparison to most broadcast facilities costs and can be amortized over long periods of use.

For example, the cost of captioning encoders remained essentially constant from 1980 on despite significant inflation over some of that period. EEG has also provided field upgrades at reasonable cost which has enabled its encoders to remain functional even after

the changes in the Line 21 specifications introduced by the TDCA. We believe that a large number of encoders produced over the last 15 years by EEG are still in service. Those that might no longer be in use are more likely to be out of service for business reasons rather than because of equipment failure or obsolescence.

The price of new encoding equipment, which includes all the capabilities needed to meet current Line 21 FCC rules is lower than their earlier counterparts due to the cost reductions available through the use of modern technology and integrated circuits.

The cost of caption data base creation is also changing. Originally, these services were provided by major entities who were set up to handle national captioning services on a large scale with prompt turn around. These caption service providers had significant set up and facilities costs. Over the years more captioning services have been created, particularly since the advent of the TDCA.

The added competition along with technology improvements in editing terminal technology has resulted in the lowering of the cost of captioning data base creation. This is particularly true in captioning at the local level where this service is often provided by a small company operating with low overhead. As captioning increases, the challenge will be to insure that the resultant captions meet the guidelines for quality.

V. The Impact of Digital Television.

The NOI asks several questions regarding the impact of digital television on captioning as to how it relates to the ATV and SDTV environments. We are presenting our comments within the framework of brief descriptions of the captioning efforts that have been undertaken in both of these digital video areas.

Captioning in HDTV

Since January 1993, the TDSS has been working to generate requirements for a next generation closed caption transmission standard for use in US HDTV transmissions. As part of this ongoing effort, system performance goals were established, improved display methods were defined and transport requirements were developed. These efforts led to the development of the Advanced Television Closed Captioning ("ATVCC) system. This system, in draft stage at this time as EIA 708, responds to the need of continuing closed captioning into future television systems and additionally anticipates the special requirements of future generation ATV receivers. It was the objective of the committee to provide a significant improvement in closed caption performance for ATV receivers. Numerous enhancements are incorporated into the proposal. Two of the more significant improvements are increased caption data bandwidth and scaleable caption displays.

The ATVCC proposal supports a much higher caption data transmission rate than that achievable in NTSC broadcast. Current NTSC broadcasts allow, in practice, the transmission of two independent caption channels. One of these caption channels is

transmitted in field 1 of NTSC video line 21. The other useable channel is transmitted in field 2 of line 21. Each of these caption channels can deliver a maximum of two data bytes per video frame. The ATVCC system provides for 40 bytes of data per frame that are shared by as many as 63 separate logical services. The increased data rate allows the captions to be better synchronized with the audio program, particularly at scene changes.

The ATVCC system's scaleable caption displays permit captions to be sized, shaped and positioned automatically on ATV receivers of different screen size and aspect ratios. This capability allows captions to be displayed in a smaller format for large size screens, and in a larger format for small screen models and as an aid for those caption viewers with low visual acuity. ATVCC additionally supports character font independence which will allow the option of more compact and easily read proportional fonts in future receivers. Lower cost ATV receivers could still use less costly mono-spaced fonts without damaging the format of the captions.

The ATVCC system relies on the Advanced Television Systems Committee (ATSC) transport to deliver its data stream. The transport issues surrounding closed captions are, therefore of primary importance to the performance of the ATVCC captioning system.

The following is a brief summary of the problems associated with the transport of live caption data in ATSC television system.

Live Captioning of ATV Broadcasts

The majority of captioned programming today is encoded simultaneous with broadcast. The broadcast signal is generally received at a remote location, the dialog is then stenographically entered into caption translation software and sent via dial-up modem to a caption encoder at the broadcast site. Current technology for stenographic entry and orthographic transcription generates a delay of approximately 3 seconds. The dial-up link and insertion of the data into the NTSC VBI requires less than 70 ms.

It is envisioned that improved transcription technology will, in time, reduce the 3 second delay considerably. This delay is a major deficiency in captioning and any additional delay would be extremely detrimental.

In NTSC signals, caption data is transmitted in line 21 of the vertical blanking interval of the video signal. There is no logical equivalent of the NTSC vertical blanking interval in the ATSC system. One approach to transporting caption data in ATSC signals is to incorporate it in another packetized stream. The Grand Alliance had originally suggested that caption data be carried in the user data of the MPEG II video stream. Alternatively, the closed caption data could be made a separately identified packetized service. These two approaches are briefly discussed below.

Transport of Closed Caption Data in MPEG-2 Video User Data

User data transport of caption data would probably work well for off-line captioned material. When considering live captioning, however, the end-to-end delay of the video rate buffering system would cause incremental delays in captioning over those

experienced in NTSC.

The end-to-end buffer delay is inherent in the video stream. It is necessitated by the need to transport a variable rate compressed video data stream over a fixed rate transmission medium. Whatever end-to-end delay is chosen for transmission will appear as delay in live captions.

In addition to this live encoding latency problem, operational problems exist including potentially lower data delivery rates in cinema modes and problems associated with the transmission of the caption data in bitstream order rather than picture display order.

In summary, MPEG video user data transport of caption data would be characterized by increased caption delay over NTSC and may have other intractable problems.

Transport of Closed Captions in a Separate Packetized Stream

If caption data was transported as a separate packetized elementary stream the video rate buffer with its inherent end-to-end delay would be bypassed. The remote captioner would view the delayed video, transcribe the dialog and transmit the caption data via dial-up (or other means) to the transport stream multiplexing site. The caption data packet could be multiplexed into the transport stream with only a slight delay. Since the caption stream is a fixed rate service, a rate buffer is not required. In theory, the data could be presented on the viewers screen with virtually no delay from the transcribed data stream. In practice, however, an appreciable delay will be necessitated by the fixed length

packet structure of GA transport.

Transmitting low data rate services such as closed captions as independent packetized streams presents a problem for the GA transport due to its relatively large fixed length transport packets. The payload of these packets can be up to 184 bytes. If captioning was to be transmitted as a separate transport packet at a 9600 baud rate (1200 bytes per second), a caption packet would be transmitted every 153 ms. This is the equivalent of 4.6 NTSC frames. This packet rate results in an average delay of 77 ms from caption encoder to receiver even if the packet multiplex process of the ATV encoder imposed no additional, appreciable delays. This is inferior to the NTSC line 21 encoding process that imposes only a 33 ms average delay from encoder to receiver. This process is, however, greatly superior in delay performance to video user data transport of captions.

If an additional 1200 bytes per second was allocated for an additional data service, it would be possible to combine the two services into one elementary stream of 2400 bytes per second. Packet frequency for the combined service would be doubled. This would result in halving the average caption latency due to packet availability. It would also result in reduced latency for the additional data service. By combining closed captioning and another low speed data service in this way both services are enhanced and cost is reduced by eliminating the need for separate transport filters and buffer mechanisms which would be required for separate packetization.

A second benefit of combining captioning with additional data is the potential of higher resistance to display errors resulting from the loss of a single transport packet. Since the caption data would be distributed over a greater number of transport packets,

development of appropriate error correction and concealment strategies would be simplified.

An additional benefit of separate packetization of closed caption data is that an independent splice point strategy could be developed. This is important for closed caption data since the problems of video splicing and editing of captioned material in NTSC are already formidable. In a GA HDTV environment, artifact free video switching and editing of captioned material would be very difficult without caption stream specific splice points identified. The GA transport has a methodology defined to support program splicing of elementary streams. This approach would be applicable to an ATV caption stream.

The disadvantage of separate packetization is that it would require a separate PID filter and rate buffer. The rate buffering should, however, be extremely small. The Grand Alliance and the Electronics Industry Association believe that the costs of transmitting closed captions in a separate PID are excessive and have therefore chosen to propose MPEG video user data transmission despite its lower caption performance and other operational problems.

Summary

In summary, the transport of ATV closed captioning as an elementary stream would seem to have the advantages of superior latency performance, a potential for superior error correction/concealment and potential efficiencies in program switching and editing.

The industry has chosen MPEG video user data transport despite its high caption

delays in an attempt to reduce receiver cost. The operational problems of video user data transport are not yet resolved.

Captioning in SDTV

Digital Standard Definition Television (SDTV) is currently being transmitted with EIA 608 format closed captions. The caption data is generally sent as two bytes per picture in the MPEG video user data. For future ATSC SDTV transmissions the commission would seem to have the option of specifying either the old style captions to be used, the ATVCC style captions, or both, at the receiver manufacturer's option. The ATVCC system provides greater performance and flexibility, and is the same system that would be used for decoding HDTV programs carried by the ATSC signal. The old style EIA 608 NTSC caption system has lower performance but makes it easier to convert from NTSC to standard definition ATSC and back. Providing both services on the signal is wasteful of bandwidth and adds expense for the program producer, but provides the most flexibility in balancing receiver performance vs. cost. There is currently no consensus in the industry as to which of these approaches should be used for the transport of standard definition ATSC captions. The EIA TDSS is currently attempting to develop recommendations on SDTV captioning.

Other Services

The increased caption data bandwidth envisioned by the ATVCC proposal allows multiple caption services to be supported. This could allow captioning in other languages and at different reading levels that would benefit a wider variety of deaf and hard of

hearing viewers.

Cost Impact of Digital Closed Captioning

The cost of ATSC closed captioning will consist of broadcast equipment cost and the cost of captioning the program material. We do not anticipate that the cost of captioning a program in ATVCC format will be significantly higher than in the current EIA 608 format. The cost of ATSC caption encoding equipment will probably be somewhat higher than similar equipment for NTSC, however, the cost will probably be an even smaller percentage of a broadcaster or program producer's total equipment outlay than it is currently in NTSC production.

Respectfully submitted,

EEG ENTERPRISES, INC.

By _____
William Posner, President

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